and it furnishes a strong argument in favor of the view that the larva is ancestral."

Mr. Field published a contribution to the Embryology of Asterias. In this form the mesenchyme formation precedes and is continued during the process of invagination, confirming the view of Metschnikoff and Korchelt as to the absence of two "urmesenchymezellen" in the Echinoderms. The author agrees with Semon's recent paper on the formation of the adoral band. At the apex of the preoral lobe there is an ectodermic thickening comparable with the apical plate of Tornaria and Trochophore. The formation of a right water pore is described in detail, confirming Prof. Brooks's discovery and reaching the same conclusion that "the state with two bilaterally symmetrical water pores is a definite stage in the ontogeny of Asterias, and that it has a phylogenetic significance. The view that the bilateral larval form of the Echinoderms is ancestral, and not secondarily acquired, is gaining ground," and the author believes that the bilateral water pores may be homologous with a pair of nephridia. The later history of the Enterocœls is described.

ENTOMOLOGY.[1]

Entomology at Washington.—Three entomological societies met at Washington, in connection with the Association of Agricultural Colleges and Experiment Stations and the A. A. A. S., during the week of August 15th to 22d. These were the Section of Entomology of the Experiment Stations, the Association of Economic Entomologists, and the Entomological Club of the A. A. A. S. Besides these gatherings many papers upon entomological subjects were read before the Society for the Promotion of Agricultural Science and Section F of the A. A. A. S. Many entomologists were present at these meetings from various states, and the entomologists of Washington added greatly to the interest taken in these meetings.

SECTION OF ENTOMOLOGY OF EXPERIMENT STATIONS.—The opening session of this section was held on Saturday afternoon, August 15th, at the Columbian University, and consisted of a discussion of the proper duties of the entomologist of a station. Nearly all the members present held that so far as practicable but few subjects

[1] Conducted by Prof. C. M. Weed, Hanover, N. H.

should be investigated at a time, and that as soon as a subject had been thoroughly studied and the results and remedies published in a bulletin of the station, that particular investigation should be considered ended, unless future investigation brought to light some new points of importance. It was not considered the duty of a station entomologist to visit various parts of his state for the purpose of showing individual farmers how to handle insecticide machinery or how to destroy the locusts, after such a subject had been thoroughly explained in a station bulletin.

Many other subjects relating to station work were brought up and discussed. An election of officers resulted in the choice of Lawrence Bruner, of Nebraska, chairman, and F. M. Webster, of Ohio, secretary.

Monday evening Prof. A. J. Cook, of Michigan, read his report as chairman for the past year, before the Association of Agricultural Colleges and Experiment Stations. The report consisted of a résumé of the work done at the stations during the year, and that which is now in progress. Owing to the early date at which a report was called for, many of the stations had not reported; but from the reports obtained it is seen that the present season has been a most active one on the part of the station workers in entomology. The results obtained at the different stations were given, and the equipments of the stations were also described. In most of the stations the entomologist has some other department in charge, and in some cases teaches as well. The best combination shows itself when the entomologist has no other department of the station, but teaches entomology and perhaps zoology in the college connected with the station.

THE ASSOCIATION OF ECONOMIC ENTOMOLOGISTS.—This association, while as yet very young, promises to become one of if not *the* foremost of its kind. Twenty-six working entomologists were present at the opening meeting on August 17th. Many new members were elected, some being corresponding members residing in foreign countries.

The opening address by Prof. James Fletcher, president of the association, was listened to with marked interest. Prof. Fletcher thought the entomologist should strive to popularize entomology as much as possible, in order that all might realize the importance of the subject from an economic standpoint as well as its possibilities, that all may see the beauties of the study of insects, even though "we don't eat them things."

Lawrence Bruner followed with an interesting paper upon "The Locust Appearances of 1891." Mr. Bruner had just returned from the western states, where the locusts are unusually abundant this year. It is feared that, unless prompt action is taken to destroy the eggs now being laid, many localities will be laid waste next year. Newspaper reports stated that railroad trains had been stopped by the locusts, and have implied that the locusts were so thick that the trains could not force their way through. The manner in which trains are stopped, however, has been by the crushing of a few hoppers upon the track, which so greased the rails as to stop the trains until sand was put upon the rails. In many of the localities infested local species have been found, although the migratory locust (*M. spretus*) was the most commonly distributed. Other species common are *M. brevitatus*, *M. atlantis*, and *D. longipennis*.

Mr. C. L. Marlatt read three short papers from C. H. Tyler Townsend, of New Mexico, upon some observations made in that region.

Prof. J. B. Smith followed with papers upon "Notes on Blackberry Borers and Gall Makers," and "The Melon Borer, *Melittia cucurbitæ*." Several points of interest were brought out.

Prof. Geo. F. Atkinson presented two papers: "A Cotton Cut-Worm," and "Note on a Nematode Leaf Disease." The case of the cut-worm upon the cotton was thought to be new.

Dr. D. S. Kellicott read a paper on "The Horn Fly in Ohio." He spoke of the appearance of this insect in Ohio and New York, and the probability as to the damage in the future.

Dr. C. V. Riley presented a paper on "Kerosene Combines with Pyrethrum." The origin and use of the so-called pyrethrum-kerosene emulsion was given. Many trials of this emulsion has proved it of but little value, and it does not merit the praise it has received.

Howard Evarts Weed followed with a paper on the "Work of the Season in Mississippi." The results of many experiments made during the season were given. *Hippodamia convergens* had been found feeding upon the cabbage, showing it to be an injurious insect. Screw worms (*Compsomyia macellaria*) have been abundant in some parts of the state during the year. Cattle at the station are kept free from ticks by feeding sulphur and salt in equal parts by keeping it before the cattle *all* the time. Cotton-leaf worms (Aletia) and boll worms (Heliothis) have so far appeared in but small numbers this season.

The secretary read a letter from Miss Eleanor A. Ormerod, of England, giving the results of Paris green experiments in England. Miss

Ormerod is a corresponding member of the association, and by her work had done much to popularize entomology in England.

Dr. C. V. Riley then presented two papers: "*Dermestes vulpinus* in Tobacco," and "Government Work *vs.* the Patent Office." The first paper dealt with a case of serious damage to a large cargo of tobacco while in shipment. It was thought the Dermestes had gained access to the tobacco while in shipment, and that it was not in the tobacco at the time of packing. The second paper presented the difficulties undergone by the Department of Agriculture owing to that department not having a lawyer to represent it in the courts. The hydrocyanic acid gas treatment for scale insects in California originated with the department, but a man not connected with the department has recently received a patent on the mere technicality of using the treatment at night. In the discussion which followed it was the opinion of most of the members that the patent would not be valid if brought up in the courts.

Prof. E. A. Popenoe, of Kansas, gave an account of a recent outbreak of *Dissostira longipennis* in that state. The outbreak has covered an extensive area, and much damage has been done.

Mr. M. H. Beckwith, of Delaware, presented some interesting "Notes on a Corn Crambid." In some localities much injury has been done.

Prof. J. B. Smith next presented two papers, one on "A Note on the Habit of *Saperda candida*," and the other, "Notes of the Year in New Jersey." The latter consisted of an account of the principal insects which have caused injury in New Jersey the present year.

Mr. L. O. Howard presented an interesting paper on "A Note on Parasites." Several new genera and species were exhibited.

Prof. Herbert Osborn presented a joint paper by himself and Mr. H. A. Gossard on "Experiments with the Hopperdozer for Grass-Leaf Hoppers." The paper gave the results obtained with this machine in Iowa this season. The hopperdozer was said to be an excellent agent in the destruction of the leaf hoppers.

Another paper, on "The Clover-Seed Caterpillar," by the same authors as the above, was read by Prof. Osborn. This insect has been very numerous at Ames this year, and has proved very injurious.

A paper upon "Notes of the Season in South Dakota" was read by the secretary from Mr. J. M. Aldrich. Grasshoppers have appeared in large numbers in this state the present season, but by the constant use of hopperdozers many are killed, and fall plowing is practiced in order to kill the eggs.

Prof. Osborn gave the results of "An Experiment with Emulsions," in which it was thought the Hubbard formula was the best combination of soap, water, and kerosene.

At the meeting last year Mr. W. B. Alwood was appointed chairman of a committee to request the various force-pump manufacturers to use a standard fitting on spray machinery, in order that any nozzle will fit any pump. Entomologists and others who have had occasion to use spray machinery have had difficulty in using nozzles upon spray pumps other than the pumps made for the particular nozzle used. Mr. Alwood, in presenting his report, stated that most of the manufacturers had agreed to use a standard fitting for the spray nozzles manufactured by them. Correspondence with the manufacturers will be continued still further, and a printed report will soon be made, giving the arrangements made by the committee and the names of the manufacturers who have given their consent to the arrangements made by the committee.

The meetings of the association were held at the Columbian University the two days preceding the meeting of the A. A. A. S. The committee on nominations of officers presented its report as follows, which was adopted:

President, Dr. J. A. Lintner, of New York; first vice president, Dr S. A. Forbes, of Illinois; second vice president, Prof. J. H. Comstock, of New York; secretary, F. M. Webster, of Ohio.

Prof. Cook gave some interesting notes upon some parasites, and Mr. Wallace presented a paper upon silk culture. At the conclusion the association adjourned to meet next year on the Monday and Tuesday before the meeting of the A. A. A. S., and at the same place.

ENTOMOLOGICAL CLUB.—The Entomological Club of the A. A. A. S. held its meetings at the Columbian University, at Washington, August 19th to 22d. Many entomologists were present, and it was probably the largest meeting of entomologists ever held in this country. By an arrangement with the Association of Economic Entomologists papers relating to economic entomology were presented before this body, while those relating to life-histories and classification were presented before the club.

President's Address.—In his address as president of the club Herbert Osborn made several recommendations of much importance. One was the advisability of an international gathering of entomologists at the World's Columbian Exposition in Chicago in 1893. He also recommended that a manual of entomology be prepared.

The Encyrtinæ with Branch Antennæ.—Mr. L. O. Howard presented specimens and drawings of several species of this subfamily in which the antennæ were variously branched.

Insect Life in the Hot Springs of Yellowstone National Park.—This consisted of a letter to Mr. Schwarz from Mr. H. G. Hubbard, who is now collecting at the Yellowstone Park. Mr. Hubbard complained of the scarcity of species in this region.

Preliminary Notes on the Insect Fauna of the Great Salt Lake, Utah.—Mr. Schwarz presented many interesting notes upon the insect fauna of this region, especially Coleoptera.

Occurrence of the Pear Midge, Diplosis pyrivora.—Dr. Lintner gave an account of the appearance of this insect in various parts of New York.

Notes on the Pear Tree Psylla, Psylla pyricola. These notes were presented by Dr. Lintner, who also exhibited specimens.

Eye-Spotted Bud Moth in Western N. Y. Some of Our Orgygias.—These two papers were presented by Dr. Lintner. The first treated of *Tmetocera ocellana* in western New York, habits, and damage caused by this insect.

Habits of Xyleborus dispar and Volucella fasciata.—Mr. J. B. Smith presented two papers upon these insects. *Xyleborus dispar* has been quite injurious this season in New Jersey, and samples of the borings of this insect were presented.

Upon the Classification of Lepidoptera.—Prof. Smith is preparing a new list of this order, which will be out soon. Many changes have been made in the arrangement of the list from that of previous lists, and the reason for these changes were given. Prof. Smith also presented two papers upon "Revision of the Genus Cucullia," and "Staining Insect Structures."

Preserving Larvæ for Class Use.—Prof. E. W. Claypole spoke of the various means for preserving larvæ for study and illustration in collection.

A Substitute for Cork.—In this paper Prof. Claypole recommended cross-sections of soft woods as a substitute for cork. It seemed to be the general opinion of the entomologists present, however, that substitutes for cork did not pay, as specimens are more apt to be broken.

Natural Habitat of the Screw-Worm.—Prof. H. E. Weed presented observations upon this insect, which leads to the belief that its natural habitat is in dead flesh and decaying vegetable matter, rather than live animals, as is generally supposed.

The following papers were also read: "Two Borers Destructive to Mountain Ash," by Dr. D. S. Kellicott; "Bibliography of Entomology," by Mr. B. P. Mann; "Notes on *Sphecius speciosus*." "Some Interesting Phylloxeræ," by C. V. Riley; "Longevity of Ixodes and Trombidium," by Miss M. E. Murfelt; "Modification of Habit in Paper Wasps," by Miss Murfelt, showing that these wasps sometimes use paper already made instead of making it from wood.

The committee on recommendation of the president's address reported that a manual of entomology should be prepared, and recommended that specialists in the different orders be invited to prepare such a manual. The committtee was continued another year, with instructions to correspond with specialists in the different orders and publishers, to report at the next meeting of the club.

The following officers were elected for the ensuing year: President, E. A. Schwarz; secretary, F. M. Webster.

The following entomological papers were read before Section F of the A. A. A. S.: "Origin and Development of Parasitic Habit in Mallophaga and Pediculidæ," by Herbert Osborn; "The Origin and Development of Parasitism Among the Sarcoptidæ," by H. Garman; "On the Habits of the Proctotrypidæ," by Wm. H. Ashmead; "The Biology of the Chalcididæ," by L. O. Howard; "Parasitism in Coleoptera, in Diptera, in Braconidæ, and Ichneumonidæ," by C. V. Riley; "Microörganisms as Insecticides," by C. V. Riley; "Enemies of the Honey-Bee," by A. J. Cook; "Notes on the Homology of the Hemipterous Mouth," by John B. Smith; "Epipharynx and Hypopharynx of Odonata," by John B. Smith; "The Mouth of *Copris carolina*, and Notes on the Homology of the Mandible," by John B. Smith.

Before the Society for the Promotion of Agricultural Science the following papers were read: "Fighting the Rose Chafer," by A. J. Cook; "Bees and Fertilization," by A. J. Cook; "A Bacterial Disease of the Chinch Bug," by S. A. Forbes; "Northward Spread of a Tropical Injurious Insect," by L. O. Howard; "The Kerosene Emulsion and Its Increasing Usefulness," by C. V. Riley.—HOWARD EVARTS WEED, *Agricultural College, Mississippi.*